

REMARKS

By the foregoing amendments the substitute specification has been amended on page 4 and claims 15, 18 and 25 have been amended. Thus, claims 15-28 remain in the application. Claims 23 and 24 have been allowed.

The change on page 4 of the substitute specification has been made to correct a typographical error in that the word "treatment" in the last line on page 4 should be --treating-- to be consistent with the translation and understandable.

Claims 15-22 and 25-28 were rejected in the outstanding Office Action under 35 U.S.C. §103(a) as being unpatentable over the patent Cole et al., U.S. Patent No. 4,870,287, in view of the patent to Nonaka et al., U.S. Patent No. 6,094,760. The patents to Cole et al. and Nonaka et al. were cited for the reasons and in the manner stated on pages 2 and 3 of the Office Action. This rejection is hereby traversed and reconsideration thereof is respectfully requested in view of the above amendments to the claims and Applicant's remarks set forth below.

The primary reference to Cole et al. relied upon in the rejection discloses a multi-station proton beam therapy system. Within the Cole et al. patent it is only mentioned that the gantry is rotatable but nothing is said about the patient table except that it supports the patient in a fixed orientation, see column 1, line 51, the abstract, and column 14, lines 1-4, for example. Applicant notes that looking carefully at the various drawings of Cole et al., one gets the impression that the patent mainly refers to various designs of proton beam guidance and to the specific way of directing the proton beam from different angles at the patients by means of a rotatable design of the

beam guidance. In Applicant's view, by having patient tables at the different stations as in Cole et al., every patient table is arranged at a different position and that at each station the proton beam can be guided to the patient's table at different angles. The main point of the Cole et al. patent is that it focuses on how to guide the proton beam, whereas the various stations therein are of minor importance. This is not the case in the present invention as discussed further below.

In contrast to the Cole et al. patent, the secondary reference to Nonaka et al. discloses a bed system for radiation therapy, a completely different situation from that in Cole et al. With the Nonaka et al. solution there exists a total flexibility in the various positions of the patient's table. In other words, the patient table can be rotated and moved around all three axes. The table is arranged in a cylinder-room formed within rotation gantry 100 of the proton beam therapy device as seen in Figure 1 of the patent, on which exterior wall the proton beam device can be moved around an angle of 360°, see rotation irradiation device (gantry) 3 in Figure 15 which irradiates the beam in any direction from the nozzle attached to its tip, column 2, lines 11 and 12, and irradiating section 12 in Figure 2 which is enabled to be rotated and moved around the bed 20 along the inner periphery surface of the rotation gantry 100, as shown in Figure 1. This means that the total movement of the patient's table and of the gantry is the main topic of the Nonaka et al. patent. The disadvantage of the solution by Nonaka et al. is that a so-called "caterpillar-like access floor", 116 in Figure 1, see column 9, lines 46-51 of the patent, has to be arranged. From a review of Figure 1 of the patent, it is seen that actually there are two kinds of caterpillar-like access floors about the

patient table. These access floors are necessary so that the patient's table is accessible at any time during the various movements which are possible.

To the contrary, an important feature of the present invention is that the patient table should be accessible from a stable floor at any time during the various movements of the patient's table and the gantry. This is possible, as the table is only rotatable within a horizontal plane around which the gantry is rotatable. That is, this is made possible by the combination of the features of the present invention, now recited in claim 15 as amended, wherein according to a first feature the proton beam guiding and control device is located so as to be turnable or rotatable by turning or rotating less than a full 360° about a horizontal axis in such a way that there results a region through which the proton beam guiding and control device is not freely movable, in which region the patient table located in essentially the plane of the horizontal axis of rotation remains accessible from the side. This first feature, together with a second feature, namely the use of a patient table which is rotatable in a horizontal plane running essential through the axis of rotation of the proton beam guiding device or parallel to it and displaced by a small deviation around an axis which runs essentially through the isocenter of the apparatus, which isocenter is formed by the intersection of the proton beam with the horizontal axis of rotation or with the intersection by approximation of the beam with the horizontal axis of rotation, results in an apparatus which, on one hand, allows treatment of the patient from all sides at one station while, on the other hand, allows the table to be freely movable and always readily accessible.

In the disclosed example embodiment of the present invention, the proton beam guiding and control device is turnable or rotatable by turning or rotating an amount limited to approximately 270° about a horizontal axis so that there results a region, a quadrant of approximately 90°, through which the proton beam guiding and control device is not freely movable. The patient table located in essentially the plane of the horizontal axis of rotation of the proton beam guiding and control device remains accessible from the side in this region as shown in Figures 1-3 of the application drawings and described in the application specification. The fact that the patient's table is accessible at any time on at least one side from a service person who is standing on a stable floor is a significant advantage of the present invention in comparison with an apparatus of the type disclosed by Nonaka et al. which of necessity employs several caterpillar-like access floors, which are not only complicated but also quite expensive. Furthermore, the so-called "roll floors" in Nonaka et al. may be the source of disturbance, in addition to the uncomfortable feeling which they cause the service personnel when walking thereon. These caterpillar-like floors can also be unstable and dangerous. The apparatus of Nonaka et al. is also disadvantageous in that, as seen in Figure 1 of the patent, there is no space beside the patient's table, 20 in Figure 1, in order to install further instruments such diagnostic equipment, x-ray devices, or other types of equipment. The apparatus of the present invention also avoids this disadvantage.

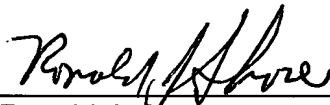
By the above amendments to independent claims 15 and 25, the aforementioned specific characteristics of the apparatus and method of the present invention have been clarified. In view of these changes, it is

respectfully submitted that the claims as amended patentably define over the cited references under 35 U.S.C. §103. Accordingly, reconsideration and allowance of the amended claims is requested.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned **"Version with markings to show changes made."**

To the extent necessary, Applicants petition for an extension of time under 37 CFR §1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 01-2135 (Case No. 635.40829X00) and please credit any excess fees to such deposit account.

Respectfully submitted,

A handwritten signature in cursive script, appearing to read "Ronald J. Shore", is written over a horizontal line.

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RJS/kmh

VERSION WITH MARKINGS TO SHOW CHANGES MADE
IN THE SUBSTITUTE SPECIFICATION

Please amend the substitute specification to read as follows:

Page 4, the single paragraph, should read:

The preferred position for a patient is the supine position so as to preclude any deformation of the organs during treatment. Therapy must therefore allow accessibility from all sides and encompass the entire human body; for this reason, the generally known proton therapy devices, including that at the Paul Scherrer Institute, are designed so that the entire proton beam guiding device housing is rotatable 360° about a central axis around the so-called patient table, with the result that the device may have a diameter of between 4 and 12 meters. Especially when treating a patient from below, the proton beam guiding device must be moved under the patient table, or the patient table must be raised to a position several meters above the actual level of the working base. The resulting specific disadvantages may also be found in the above-cited literature reference on page 49 in chapter IV, D4 which cites the problems entailed by raising the patient table in this way. This positioning process is critical, and in the event the device experiences an accident during treatment, a special crane device is required to extract or manage the patient. While this disadvantage may be alleviated by providing a relatively deep shaft under the patient table, this approach creates a risk of accidents, such as the person [treatment] treating the patient falling into this shaft.

IN THE CLAIMS

Please amend claims 15, 18 and 25 to read as follows:

15. (Amended) Apparatus for treating a patient using proton therapy, comprising:

a proton beam guiding device employing magnets, quadrupoles, and an end-mounted proton beam guiding and control device with an exit window for guiding or directing the proton beam to the treatment spot in the patient;

a controllably movable patient table for moving the patient to the desired position relative to the proton beam;

wherein the proton beam guiding and control device is located so as to be turnable or rotatable by turning or rotating less than a full 360° about a horizontal axis in such a way that there results a region through which the proton beam guiding and control device is not freely movable, in which region the patient table located in essentially the plane of the horizontal axis of rotation remains accessible from the side; and

wherein the patient table is rotatable in a horizontal plane running essentially through the axis of rotation of the proton beam guiding device or parallel to it and displaced by a small deviation around an axis which runs essentially through the isocenter of the apparatus, which isocenter is formed by the intersection of the proton beam with the horizontal axis of rotation or with the intersection by approximation of the beam with the horizontal axis of rotation.

18. (Amended) Apparatus according to claim 15, wherein the patient table is arranged to be rotatable or movable in [a] the region of the

horizontal plane through which the beam guiding and control device is not movable[, or which region lies opposite another region through which the beam guiding and control device is movable].

25. (Amended) A method for treating a patient using proton therapy, the method comprising:

directing a proton beam to a treatment spot in a [patent] patient using an apparatus comprising a proton beam guiding device employing magnets, quadrupoles, and an end-mounted proton beam guiding and control device with an exit window for guiding or directing the proton beam to the treatment spot in the patient, wherein the proton beam guiding and control device is located so as to be turnable or rotatable by turning or rotating less than a full 360° about a horizontal axis in such a way that there results a region through which the proton beam guiding and control device is not freely movable; and a controllably movable patient table for moving the patient to the desired position relative to the proton beam; and

wherein the method includes positioning a person lying on the patient table by moving the patient table and proton beam guiding and control device of the apparatus such that the proton beam is directed to the treatment spot in the patient, and wherein the patient table remains accessible by way of said region at all times from one side.